

genito-urinary system until something more is known about them.

From this brief sketch it will be gathered that the author has considerably improved the work in most respects; but we regret to see the terms *epi* and *hypo* still used in describing the embryonic layers, instead of the prefixes *endo* and *ecto* used by German zoologists, which are greatly preferable, especially in teaching students. We would have liked also to have seen less clarendon type used in the text and restricted to headings only, also the retention of the German system of emphasising words and passages by means of double spacing between the letters of the type.

Doubtless the new edition of the "Elements of Comparative Anatomy of Vertebrates" will continue, and that deservedly, to retain its place amongst students' manuals. J. G. G.

ANIMAL PLAY.

The Play of Animals; a Study of Animal Life and Instinct. By Karl Groos. Translated by Elizabeth J. Baldwin; with a Preface and Appendix by J. Mark Baldwin. Pp. xxvi + 341. (London: Chapman and Hall, Ltd., 1898.)

THIS interesting little work, the preface to the original German edition of which is dated 1895, presents one very unusual peculiarity. The editor, with the author's approval, has acted the part of the candid friend, and in his preface has given not only a valuable synopsis of the chief contents and object of the book, but has added such careful criticisms on the author's theories as to render further critical observations almost superfluous, Prof. Baldwin being a well-known authority on subjects akin to those treated by Prof. Groos.

Not only is the book practically unique in its subject, but it appeals to two distinct classes of readers. In the first, second, and fifth chapters it appeals to the philosophical student of animal play as a serious subject; while the third and fourth chapters are devoted to actual illustrations of this play, and, as charmingly written and authentic anecdotes, will delight a much wider circle. Indeed, to both classes of readers the work may be commended with every confidence.

The author takes, so to speak, a very serious view of the importance of play in animal development, and treats it with the profundity of research characteristic of the German investigator. He says, for instance (p. 291), that

"it seems a very mistaken proceeding to characterise play as aimless activity, carried on simply for its own sake. Energetic action may be provocative of pleasure, but it is by no means the only source of the pleasure produced by play."

And the view that play is a veritable instinct is elaborated with great wealth of detail in the second chapter. Here, as the editor remarks, we have full details of such interesting topics as imitation in its relation to play, the inheritance of acquired characters in relation to the rise of instincts, and the plan and function of intelligence in the origin of these primary animal activities. And here,

perhaps, the humanitarian may derive a mitigated satisfaction from the theory (pp. 121 and 122) that the cat's treatment of the captured mouse is not due to the love of torture for torture's sake, but is owing to an instinctive exercise for acquiring skill in the chase, turned later into practical account by the captor.

The first chapter is an examination of Mr. Herbert Spencer's theory of the "surplus-energy" origin of play, which, if we accept the author's views, must for the future be put aside. Chapter ii., which deals with the biological theory of play, must be read in connection with Chapter v., of which the physiology of play forms the subject; these three chapters, as already stated, supplying the theoretical and philosophical matter of the book, while the two intermediate chapters afford the detailed facts on which the superstructure rests.

Some of the author's main theoretical positions are concisely summarised in the following extract from his editor's preface:—

"He holds play to be an instinct developed by natural selection, . . . and to be on a level with the other instincts which are developed for their utility. It is very near, in its origin and function, to the instinct of imitation, but yet they are distinct. . . . Its utility is in the main twofold. First, it enables the young animal to exercise himself beforehand in the strenuous and necessary functions of its life, and so to be ready for their onset; and, second, it enables the animal by general instinct to do many things in a playful way, and so to learn for itself much that would otherwise have to be inherited in the form of special instincts; this puts a premium on intelligence, which thus comes to replace instinct. Either of these utilities, Prof. Groos thinks, would ensure and justify the play instinct; so important are they, that he suggests that the real meaning of infancy is that there may be time for play."

For the difficulty the editor sees in this conception of play as a pure instinct, the reader must be referred to the work itself, which is long likely to maintain the leading position in a new and important field of inquiry.

The data on which the author relies as his basis for theorising are necessarily in great part drawn from the writings of others. In the selection of these he appears to have exercised a wise discrimination. His great obligations to Brehm's "Tierleben" are fully acknowledged, and we are glad to see that he accepts all the observations of Mr. W. H. Hudson, some of which we believe there has elsewhere been a tendency to discredit. In the main the animals referred to are rightly named, but we shall be surprised if the creatures termed "badgers" on p. 113 of the translation are not really rats.

R. L.

OUR BOOK SHELF.

The Study of Man. By Alfred C. Haddon. Pp. xxxi + 512. (London: Bliss, Sands, and Co. New York: C. P. Putnam's Sons, 1898.)

THE publication of this volume will doubtless be the means of exciting interest in anthropological inquiries, and adding to the number of scientific students of human-kind. The work is not a systematic treatise on anthropology, but a collection of articles upon various subjects of anthropological study, containing much that is interesting to the serious student, for whose benefit

numerous references are given to original papers, and written in a style which should prove attractive to every intelligent reader.

After an introductory account of the scope and aims of anthropology, Prof. Haddon describes the usual anthropological measurements, and then surveys such features as the colour of the hair and eyes, the form of the head, and the character of the nose, drawing instructive conclusions from the facts as to the distribution of these characteristics. To illustrate the value of blending anthropological investigations with the records of history, he devotes a short chapter to an abstract of Dr. Collignon's work on the ethnography of the Dordogne district of West Central France. Following this are two interesting chapters on the evolution of the cart, and the origin of the Irish jaunting car, which latter conveyance Prof. Haddon shows was evolved at the end of the last century, or more probably within the first few years of this century. A series of popular articles on the history and literature of toys and games are used as the basis of the succeeding eight chapters, the chapter on "bull-roarers" being particularly noteworthy. Finally, instructions are given for conducting ethnographical investigations, based upon those issued by the British Association Committee on the Ethnographical Survey of the United Kingdom. It will be understood from this outline that Prof. Haddon's work, which, we may add, is illustrated by a number of good figures, will interest the public in anthropological science, and thus assist in the preservation of vanishing knowledge.

A School Geography. By George Bird, B.A., F.G.S.
Pp. x + 294. (London: Whittaker and Co., 1898.)

THIS volume is distinctly in advance of the usual school-books of geography; for it belongs to the steadily increasing class of works which aim at making the study of scientific subjects educative as well as informing. The long lists of capes, rivers, mountains, &c., which still frequently figure in school geographies, and have to be committed to memory by the unfortunate pupils of teachers behind the times, have been omitted, and instead of pages of unnecessary statistics we have a logical statement based upon a rational scheme of geographical teaching. In the author's words: "While trying to make the book interesting, I have also tried to make it of educational value by continually referring to the influence of the geographical position and surroundings upon—the climate, productions, industries, and trade of the various countries."

Every geographer admits that these are the right lines to follow, but opinions differ as to the amount of astronomical geography which should be studied before the pupil passes to the description of the various countries. Mr. Bird commences with a chapter on astronomical geography, and then deals in successive chapters with land, water, air and climate, before passing to general geography. With the exception of the first chapter, these introductory descriptions will be easily understood by the pupils of about twelve or thirteen years of age, for whom the book is intended. Teachers of geography know how very difficult it is to give young pupils clear and accurate ideas concerning the movements of the earth and the phenomena produced by these motions, and many of them will probably take Mr. Bird's hint to touch but lightly upon topics in the opening chapter in going through the book for the first time. If more prominence had been given to apparent phenomena, which the pupils can observe for themselves, and less to the actual conditions which produce them, this chapter would have gained in educational value. But this is a minor point, and the book as a whole represents a creditable attempt to improve the teaching of geography in this country.

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LETTERS TO THE EDITOR

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A Case of Inherited Instinct.

THREE species of cave locusts are found in New Zealand, belonging to three different genera. (1) *Pachyrhamma spelunca* is allied to *Gymnoplectron longipes*, which lives among the branches of trees, both genera being known only from the north island. (2) *Pleiopectron edwardsii* inhabits caves in the south island, and has close allies, belonging to the same genus, living amongst old wood in both islands. (3) *Macropathus lififer* is allied to *Pharmacus montanus*, which lives in the open among rocks, both genera being from the south island. *Macropathus* and *Pleiopectron* may have originated from a common ancestor in New Zealand, but *Pachyrhamma* belongs to another section, and is more nearly related to European and American species than to the other cave locusts of New Zealand. These three genera belong to that group of the *Stenopelmaticide*—distinguished by having no pads on the tarsi—to which all the cave locusts of North America, Europe, and Burma belong; the habit of living in caves appearing to be an instinct found only in that group among the whole of the *Locustodea*.

So much for the facts: now for the inference. We cannot suppose that the ancestors of the New Zealand cave locusts, who migrated to that country through what is now called the Malay Archipelago, lived in caves during the whole of the migration; partly from the impossibility of their having passed from one cave to another, and partly because each species has allies which do not live in caves. If this be so, we have here a most interesting case of an instinct which has not only been transmitted through many generations, but which must, in at least two cases, have remained dormant during the greater part of the southerly migration, and reappeared when favourable conditions enabled it to do so. For we are compelled to assume that none of the first *Stenopelmaticide* which came to New Zealand lived in caves, and that some of the descendants of the northern cave locusts reverted to that curious mode of life.

F. W. HUTTON.

Christchurch, N.Z., July 20.

Transference of Heat in Cooled Metal.

YOUR issue of June 30, containing a letter from M. Henry Bourget under the above heading, has only just come into my hands. In 1889, when working at the Cavendish Laboratory, Cambridge, I was interested in the phenomenon described by M. Bourget, and made a few preliminary experiments in connection therewith, but, owing to other work, I was unable to proceed very far with the investigation, and probably shall not have the opportunity of doing anything further. My notes, taken at the time, show that the following experiments were made and results obtained:—A large well-used soldering bolt had a hole drilled nearly through the iron shank at the end remote from the copper portion; into this hole, and surrounded with mercury, was placed the bulb of a thermometer with small thermal capacity; a bunsen flame was then placed beneath the copper portion, and the heating continued until the thermometer indicated a steady temperature. The flame was then removed, and a vessel containing water brought up over the hot end, upon which the thermometer showed a rise of 1.5°C . There was a considerable film of copper and iron oxides, &c., at the junction of the iron and copper.

After this a copper rod $\frac{3}{8}$ inch diameter and 18 inches long, and with a bend of about 45° , 4 inches from one end; at the end of the 14" portion, close to but just not touching, was placed a sensitive thermopile connected up to a low-resistance reflecting galvanometer. The rod was set up with the longer portion horizontal, and the 4-inch portion depending. The end of the rod and the thermopile were well shielded by means of asbestos and dusters, and the rod passed tightly through a hole in a large vertical sheet of asbestos millboard in order to protect the thermopile further from any chance currents of heated air or steam.

As before, a bunsen flame was placed at the centre of the